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L6: Entry 1 of 6 File: USPT Mar 30, 1999

DOCUMENT-IDENTIFIER: US 5889900 A
TITLE: Integrated optic tunable filters and their methods of fabrication and use

BSPR:
A number of different technological approaches have been used in the design and implementation of optical filters to provide the required functionality for the above applications. Among these approaches have been those based on tunable liquid crystals (LCTF), tunable acousto-optics (AOTF), unbalanced Mach-Zender interferometry, reflective waveguide arrays, and many types of etalons.

DEPR:
Substrate 10 may be formed of any suitable material that can support the fabrication of the optical waveguide 12. Waveguide 12 is expediently fabricated by one of two methods. The first method comprising depositing a material such as a metal on the surface of the substrate, delineating the waveguide pattern using standard lithography techniques, followed by raising the temperature of substrate 10 to cause an in-diffusion process after which the material on the surface is diffused into the substrate causing a local increase in its optical index of refraction to form the waveguiding region. Alternatively, the delineation of the surface of substrate 10 is done using photolithographic techniques followed by exposure to a solution which exchanges certain atoms in substrate 10 with atoms in a solution causing the index in the delineated regions to be increased thereby creating the waveguide 12. Some combination of the two foregoing techniques may also be sensibly used to form waveguide 12.

DEPR:
Further, waveguide 12 is fabricated to support two orthogonal polarization modes in the operating wavelength range. As is well-known, these modes are termed the Transverse Electric (TE) and Transverse Magnetic TM) modes which are set, respectively, to be parallel and perpendicular to the substrate surface. The electric field mode profiles of the TE and TM modes must be sufficiently similar so the spatial overlap, defined by the overlap integral of the spatial field distributions, is optimized. To achieve this, those skilled in the art may select from among known processes with temperatures and times, material layer thickness, exchange solutions and gases. Lithium niobate and lithium tantalate are preferred substrate materials for both processes. Titanium metal in-diffusion and/or benzoic acid (proton or hydrogen) exchange are standard waveguide fabrication processes that may readily be employed. Other

substrate materials include soda lime glass with the waveguide formed via an exchange process using potassium or cesium ion solutions.

DEPR:
A standard in-diffusion process is to deposit 800-1500 angstroms of titanium onto the surface of an x-cut lithium niobate crystal and heat to an in-diffusion temperature of 900-1200 C. for a duration of 8-12 hours. A standard ion exchange process is to expose the substrate to a benzoic acid melt at 200-300 C. for 10-60 minutes and postbake at 300-400 C. for 2-8 hours.

DEPR:
In temperature tuning, the birefringence of substrate 10 and/or waveguide 12 varies with temperature. Normally, the birefringence increases with higher temperature. Referring to FIG. 4, filter 8 is shown mounted on a high thermal mass base plate 80 made of a material such as aluminum or copper. A thermocouple 84, which monitors the temperature of substrate 10, is thermally coupled to filter 8 and fed into a controller 82. Also mounted on base plate 80 is a thermoelectric heater or cooler 86, which is connected to the controller 82. The controller 82 also contains a set mechanism 88 for the user to tune filter 8. The feedback controller 82then maintains the constant temperature and spectral response of filter 8. The same techniques are used to spectrally tune distributed feedback laser diodes (DFB). Temperature stability of 10.sup.-2 degrees C. is routinely achievable. Anisotropic temperature-optical coefficients are readily found in numerous optical material handbooks.

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L5: Entry 6 of 6 File: DWPI Feb 18, 2000

DERWENT-ACC-NO: 2000-063697
DERWENT-WEEK: 200020

TITLE: Laser-scanning microscope with an AOTF

INVENTOR: SIMON, U; WILHELM, S

PATENT-ASSIGNEE:

ASSIGNEE	CODE
ZEISS JENA GMBH CARL	JENA

PRIORITY-DATA:

1998DE-1027140	June 18, 1998

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC				
JP 2000047117 A	February 18, 2000	N/A	005	G02B021/00				
DE 19827140 A1					December 23, 1999	N/A	005	G02B02

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-NO		
JP2000047117A	May 24, 1999	1999JP-0143181	N/A	June 18, 1998	1998DE-10
DE			19827140A1		

INT-CL (IPC): G01B 11/00; G01K 11/22; G01N 21/27; G02B 21/00

ABSTRACTED-PUB-NO: DE 19827140A
BASIC-ABSTRACT:

NOVELTY - A laser-scanning microscope has an AOTF in a laser input b coupler, with a temperature sensor arranged adjacent to the AOTF and for heating and cooling of the AOTF.

USE - As laser-scanning microscope.

ADVANTAGE - Correct temperature control of the AOTF ensures that the loss of light intensity from the laser.

DESCRIPTION OF DRAWING(S) - Figure shows the beam input to a laser-s

microscope.

CHOSEN-DRAWING: Dwg.1/2

TITLE-TERMS: LASER SCAN MICROSCOPE

DERWENT-CLASS: P81 S02 S03

EPI-CODES: S02-J04B1; S03-E04R;

SECONDARY-ACC-NO:
Non-CPI Secondary Accession Numbers: N2000-049889